

What is claimed is

1. A method for inducing differentiation of mammalian embryonic stem cells into functioning cells, which comprises the steps of;

5        1) culturing the mammalian embryonic stem cells together with feeder cells with a medium comprising leukemia inhibitor factor;

10      2) culturing the obtained cells in absence of feeder cells with a medium comprising leukemia Inhibitor factor and basic FGF in a suspension culture condition to give embryonic bodies;

15      3) culturing the obtained embryonic bodies with a selection-expanding medium; and

4) culturing the obtained cell clusters with a differentiation medium to give functioning cells.

2. The method of claim 1, wherein the medium used in step 2) comprises about 100-10000 U/ml of leukemia inhibitor factor.

3. The method of claim 1, wherein the medium used in step 2) comprises about 2-100 ng/ml of bFGF.

20      4. The method of claim 1, wherein the medium used in step 3) comprises nicotinamide, insulin and fibronectine in an serum-free cell culture medium.

5. The method of claim 1, wherein the functioning cells are insulin producing pancreatic islet like c II clusters.

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6. The method of claim 5 wherein the medium used in step 4) comprises nicotinamide, insulin and laminine in a serum-free cell culture medium.
7. The method of claim 1, wherein the functioning cells are nerve like cells.
- 5 8. The method of claim 7 wherein the medium used in step 4) comprises L-lysine, insulin and laminine in a serum-free cell culture medium.
9. Functioning cells induced from mammalian ES cells by the method of claim 1.
- 10 10. Insulin secreting cell clusters induced from mammalian ES cells by the method of claim 5.
11. Nerve like cells induced from mammalian ES cells by the method of claim 7.
- 15 12. A method for treating a mammalian patient having disorders in pancreatic islet function, which comprises implanting pancreatic islet-like cell clusters induced from allogenic ES cells by the method of claim 5 to the patient.
13. The method of claim 12, wherein the patient is type I diabetic patient.
- 20 14. A method for treating a mammalian patient having disorders in nerve function, which comprises implanting nerve like cells induced from allogenic ES cells by the method of claim 7 to the patient.